

4.4 CONSTRUCTION MANAGEMENT

4.4.1 Management Structure

The Applicant intends to enter into two primary agreements for the construction of the Project including an agreement for the supply, erection and commissioning of the wind turbines as well as an Engineering, Procurement and Construction (‘EPC’) contract for the construction of the balance of plant (‘BOP’) which includes all other Project facilities and infrastructure such as the roads, electrical collection system, substation, O&M Facility, etc.

4.4.1.1 Project Construction Management

The Project Management organizational structure will include two support groups: engineering and design specifications team and the field site management team. Figure 4.4-1 illustrates the construction management organizational structure for the Project. The Project Manager will handle contractual aspects of the agreements with the project managers of the wind turbine vendor and the EPC contractor. This organizational chart represents a typical structure for wind power projects. The exact organization may change after award of the turbine supply contract, EPC contract and other subcontracts.

4.4.1.2 Engineering and Design Specifications Team

The engineering and design specifications team is responsible for establishing the design and construction specifications for the various portions of the Project. The engineering team acts a third party verification group in conjunction with the Project’s field QA/QC team. The engineering team will review proposals from the various turbine suppliers and EPC contractors for equipment supply and construction work. The turbine supplier and EPC contractor will be responsible for the detailed design work for the Project and for submitting these designs and equipment specifications to the Project engineering team for review. Review by the Project engineering team ensures that the detailed construction plans will meet the required design specifications, codes and standards for the Project.

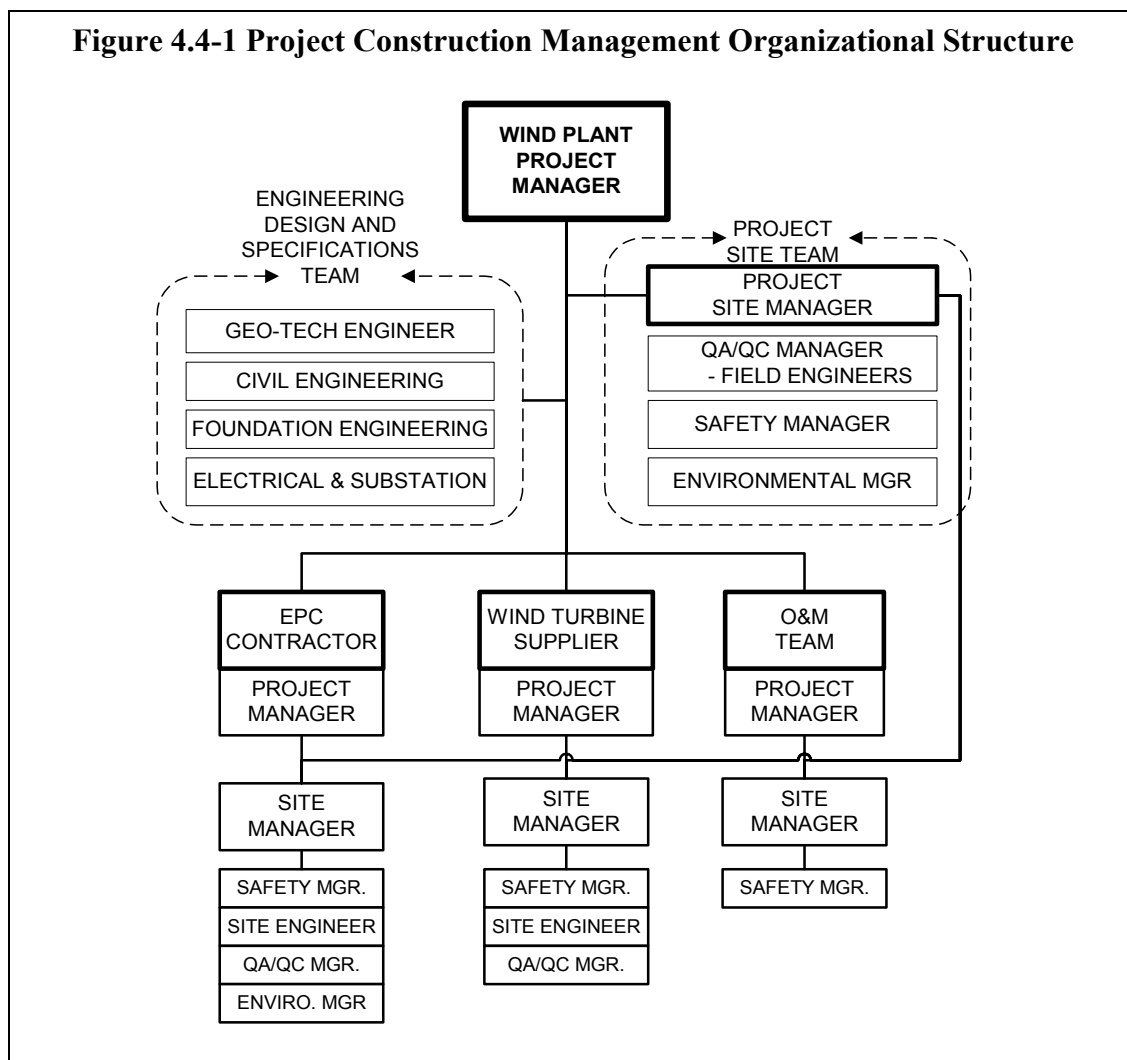
4.4.1.3 Field Site Management Team

The field site management team will oversee all aspects of construction on-site and will ensure that work is performed in accordance with the engineering plans and specifications, environmental requirements and good industry practice. The field site team will generally be involved in day-to-day issues as they arise throughout the construction phase. The Project Site Manager will have a support team consisting of quality assurance and quality control (QA/QC) specialists, environmental inspectors, and site safety officers. The site team will also rely on the engineering team for in the field support during critical operations such as for energizing of the substation and for technical issues as they arise during Project construction.

4.4.1.4 EPC Contractor's Construction Management Team

The EPC Contractor will be responsible for managing several construction subcontractors including all BOP items such as the roads, electrical and communications system infrastructure, substation and O&M Facility. The EPC Contractor will have a lead Project Manager, a Project Engineer and a Site Manager supported by their own field engineering team, quality assurance and quality control specialists, environmental monitors, and site safety officers. The EPC Contractor will be required to implement and perform a safety plan, a QA/QC plan, and an environmental protection plan, including the storm water pollution prevention plan (SWPPP). The QA/QC plan, safety plan, environmental protection plan and SWPPP will be submitted to EFSEC for its review and approval prior to commencement of construction.

4.4.1.5 Wind Turbine Vendor's Construction Management Team



The wind turbine supplier will be responsible for the supply, delivery, erection and commissioning of the wind turbines. The turbine supplier's construction team will include a lead Project Manager, a Site Manager, transportation specialists and several lead technician foremen to support the proper and safe handling, assembly, erection and commissioning of the WTGs. The turbine vendor's site team will also be supported by their own quality assurance and quality control specialists and site safety officers. The turbine supplier will be required to implement and perform a safety plan, a rigorous QA/QC plan and a detailed commissioning plan.

4.4.1.6 Project Operations and Maintenance (O&M) Team

The Project O&M group will be on site during the commissioning and start-up phase of construction. Once a turbine is commissioned, it is turned over to O&M group control. The O&M team generally consists of a Project site manager, a team of wind turbine field technician specialists, and administrative support staff.

4.4.2 Quality Assurance/Quality Control

A Quality Assurance (QA) and Quality Control (QC) Program will be implemented during all phases of the Project to ensure that the engineering, procurement, construction, and startup of the facility is completed, as specified. The EPC and Turbine Supply Contracts will require that a Project construction procedures manual be submitted prior to any site construction for review and approval. The manuals will describe how the contractors will implement and maintain QA/QC, Environmental Compliance Programs, Health and Safety Compliance Programs and integrate their activities with the other contractors during all phases of the work. The EPC contractor and turbine supplier will be responsible for enforcing compliance to the construction procedures program of all of its subcontractors.

In the QA/QC Program, the contractor will describe the activities and responsibilities within its organization, and the measures to be taken to assure quality work in the Project. Some of the topics that will be covered are design control, configuration management and drawing control. Independent QA/QC personnel will review all documentation (design, engineering, procurement, etc.) and witness field activities as a parallel organization to that of the construction contractors to assure compliance with the specifications. In the installation, alignment and commissioning of all major equipment and for the energization of all electrical systems, field inspectors' acceptance will be required.

QA/QC inspections of the major facilities and equipment listed below will typically include, but not be limited to, the following operations, checks and review:

Factory QA/ QC

- Inspection of turbines at manufacturer's facilities;
- Review and inspection of 3rd party test verification reports;
- Review and inspection of manufacturer's QA/QC procedures for ISO compliance;

- Review and inspection of main component suppliers' ISO QA/QC procedures;
- Manufacturing drawing review and verification;
- Verification of welding procedure specifications (WPS) compliance;
- Material mill certificates tracking system and verification;
- Overall visual inspection (including assembly, fastening systems and welding);
- Inspection of flange interface flatness measurements, finishing and protection;
- Witness or review of turbine nacelle and drive train run-in load testing;
- Witness or review of turbine blade load testing;
- Inspection of paint finishing and protection;
- Inspection of painting/marketing/preparation for shipment;
- Verification of factory wiring and tagging;
- Shipment packaging and handling, tracking and identification;
- Pre-Commissioning field testing and verification.

Field Inspection QA / QC

- Review equipment and material delivery acceptance inspection procedures;
- Inspection of all critical interfaces including flanges and electrical terminations points;
- Verification of all mechanical assembly work including turbine erection;
- Verification of field wiring and tagging;
- Pre-Commissioning field testing and verification.

Roadways and Civil Work

- Field verification of road locations to site plan and survey markings;
- Review of clearing and grubbing and compaction process;
- Verification of adequate road materials and compaction to engineer's specifications;
- Verification of road grade, dimensions and compaction requirements to plans.

Concrete/Structural

- Inspection of batch plant facilities, engineer's review of mix design and break test verification;
- Inspection of forms, structural steel and rebar prior to backfilling and prior to casting;
- Field engineer's witness of concrete pouring;
- Inspection of concrete testing during pour (slump) and verification of break tests results.

Electrical Collection System

- Inspection of cables and trenches prior to burial and backfilling;
- Witness of proper backfilling procedures;
- Inspection of terminations and termination hardware at pad transformers, junction boxes, pad switches, risers, etc.;
- Witness and/or review of polarity, cable marking and phase rotation tests;
- Witness and/or review of grounding system resistance measurements;

- Inspection of all lock-out tag-out locations and energization sequences and plan.

Pad-Mount Transformers and Main Substation Transformers

- Inspection of transformers at manufacturer's facilities;
- Witness and/or review of winding resistance, polarity and phase displacement tests;
- Witness and/or review of no load losses and excitation current at rated voltage and frequency;
- Witness and/or review of impedance voltage and load losses at rated current and rated frequency;
- Witness and/or review of high potential and induced potential tests;
- Witness and/or review of impulse tests, reduced full wave, chopped wave and full wave tests;
- Witness and/or review of regulation and efficiency calculations;
- Verification of compliance to engineering specifications;
- Inspection of painting/tagging/preparation for shipment;
- Verification of field wiring and tagging.
- Substation Breakers
- Witness and/or review of rated continuous current and short circuit tests;
- Witness and/or review of dielectric withstand tests;
- Witness and/or review of switching tests;
- Witness and/or review of insulator tests;
- Witness and/or review of mechanical life tests;
- Witness and/or review of terminal loading tests;
- Witness and/or review of partial discharge tests;
- Verification of compliance to engineering specifications;
- Inspection of painting/tagging/wiring/preparation for shipment;
- Verification of field wiring and tagging.
- Substation Relaying and Instrumentation
- Inspection of manufacturer's facilities
- Verification of instrument and relay compliance to specifications;
- Verification of installation in accordance with drawings;
- Witness and/or review of instrument and relaying calibration;
- Verification of field wiring and tagging.
- Substation Structural Steel Work
- Inspection of manufacturer's facilities;
- Review and inspection of manufacturer's QA/QC procedures;
- Manufacturing drawing review and verification;
- Verification of welding procedure specifications (WPS) compliance ;
- Material mill certificates tracking system and verification;
- Overall visual inspection (including assembly, fastening systems and welding);
- Inspection of flange interface flatness measurements, finishing and protection;
- Inspection of paint finishing and protection.

Safety

- Review of safety procedures;
- Observation and attendance of safety training for supervisors and field staff (tail gate meetings);
- Review of construction safety techniques and implementation;
- Verification of safety incident reports and statistical data.
- Witness of construction implementation;
- Inspection of spill sites and cleanup and review of spill reports;
- Environmental Protection
- Review of erosion control and storm water pollution prevention plans;
- Witness of construction implementation;
- Witness of erosion control performance;
- Ensuring sensitive areas are flagged and avoided;
- Inspection of spill sites and cleanup and review of spill reports;
- Continuous inspection for trash and debris removal from the Project site.

4.4.3 Environmental Protection

The Environmental Compliance program will ensure that construction activities meet the conditions, limits and specifications set in environmental standards established in the Site Certification Agreement and all other environmental regulations.

Copies of all applicable construction permits will be kept on-site. The lead Project construction personnel and construction Project Managers will be required to read, follow and be responsible for all required compliance activities. A Project Environmental Monitor will be responsible for ensuring that all construction permit requirements are adhered to, and that any deficiencies are promptly corrected. The Environmental Monitor will ultimately report to the Project Manager and will provide weekly reports on environmental problems reported or discovered as well as corrective actions taken to resolve these problems. The Environmental Compliance Program will cover avoidance of sensitive areas during construction, waste handling and storage, stormwater management, spill prevention and control and other components required by state and county regulation. Upon identification of an environmental noncompliance issue, the EPC contractor Environmental Monitor will work with the responsible subcontractor or direct hire workers to correct the violation; if not corrected in a reasonable period of time a “stop work” request can be issued for that portion of the work not in compliance with the Project environmental requirements.

4.4.4 Safety Program

4.4.4.1 Health and Safety and Spill Prevention Control and Countermeasure (SPCC) Plans

Prior to the commencement of any construction work, the Wind Plant Project Manager will require a Health and Safety and Spill Prevention Control and Countermeasure Plan

(SPCC) from both the main EPC contractor and WTG vendor. These plans apply to all work performed on the construction site and to all subcontractors that both the EPC or WTG vendor may have on site. The Health and Safety Plans are designed to ensure that all laws, ordinances, regulations and standards concerning health and safety issues are complied with.

4.4.4.2 Health and Safety Plan

Generally, Health and Safety Plans for wind power project construction and operations cover many areas which relate to all aspects of construction and operations activities. The operations safety plan will be the same as the construction safety plan with variations on the training program suitable for the emphasis on the types of work being performed. The Safety Plans will include, but not be limited to:

- General Facility Information
 - Owner / Operator
 - Construction and Operation
 - Persons Assigned to Safety Plan Leadership
 - Project and Area Map
- Emergency Plan
 - Locations of Hospitals, Emergency Contacts, Air Lift Plan, etc.
- Safety Training Programs and Policies
 - Drug and Alcohol Free Workplace Policy
 - Personal health and safety
 - Fall Safety
 - Confined Space
 - Excavation Safety
 - Crane and rigging safety
 - Equipment and operations safety
 - Fire prevention and fire safety (hot work permits)
 - Electrical safety – lock-out tag-out
 - Hazard Notices and Communication

4.4.4.3 Spill Prevention Control and Countermeasure (SPCC) Plan

The Spill Prevention Control and Countermeasure Plan (SPCC) will cover high risk liquids that are expected to be on site during construction and operations. The general contents of the SPCC will include but not be limited to the following main areas:

- General Facility Information
 - Owner / Operator
 - Construction and Operation
 - Persons Assigned to Spill Prevention and Control
- Potential Spill Hazard Sources and Vulnerability
- Spill Response Plan Procedures (Available Equipment, Materials and Suppliers)
- Spill Incident Reporting and Record Keeping

- Facility Drainage
- Personnel Training
- Tank Management Program
- Personal health and safety

4.4.4.4 Safety Managers

As illustrated in Figure 4.4-1 above, a safety manager is part of every construction team including the Project Site Management team, the EPC Contractor, the WTG Vendor and the O&M team. Each team safety manager is responsible for construction health and safety issues in the field and each will ensure that any identified deficiencies spills and/or accidents are corrected as fast as possible.

4.4.4.5 Stop Work Authority

Each team safety manager (i.e. EPC Contractor, the WTG Vendor and the O&M team) has the authority to issue a “stop work” notice when health and safety issues, including any subcontractor safety issues, are violated and the health and safety of construction personnel are in danger. For health and safety “stop work” orders, the action may only be for a portion of the work that endangers a limited portion of the Project site or activities. The Project construction procedures will clearly spell out the “stop work” procedures which will require a written action request with justification on the part of the designated Safety Manager.

Upon identification of a health and safety issue, the Safety Manager will work with the responsible subcontractor or direct hire workers to correct the violation; if not corrected in a reasonable period of time the “stop work” request can be issued. The on-site safety manager and on-site construction manager will determine the amount of time that is reasonable and prudent to rectify or take action on a potential safety hazard. Generally the definition of “reasonable time” is not more than 24 hours. If a serious safety issue is identified which poses an immediate threat, the affected area will be required to be shut down immediately and remain roped off and off limits until the safety violation is rectified. If immediate action is not taken by the construction contractor(s), the construction management team will take action to immediately shut down the area of concern. For issues relating to safety procedures, the general contractor will be given 24-48 hours (at the discretion of the on-site safety manager) to provide tailgate safety training to all involved on-site construction staff.